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09/923,983	08/07/2001	Luo Steven	P01018US1A	3562

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EXAMINER	
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Commissioner for Patents

Currently, claims have been rejected under 35 U.S.C. 112, 1st paragraph since there appears to be lack of adequate support for the claimed ranges of "at least about 1.4 parts by weight of antioxidant (AO) per 100 g polybutadiene" and "at least about 0.7 parts by weight of AO per 100 g polybutadiene" (claims 1 and 29), and "at least about 2 parts by weight of AO per 100 g polybutadiene" (claims 23 and 32).

Applicants show support for the following ranges, as recited in the specification and Luo (U.S. 6,117,956), the contents of which have been incorporated by reference.

- In terms of the antioxidant (AO), the specification recites the following ranges:
  0.1-10 pw AO / 100 g butadiene
  0.2-5 pw AO / 100 g butadiene
0.5-3 pw AO / 100 g butadiene
- In terms of the transition metal, Luo recites the following ranges:
0.01-2 mmole / 100 g butadiene
0.05-1 mmole / 100 g butadiene
- The specification shows a working example using:
0.1 mmole of Fe / 100 g butadiene

A rejection under 35 U.S.C. 103(a) over Kline in view of Luo is based on these facts:
- Specific antioxidants include 2,6-di-t-butyl-4-dimethylaminomethyl phenol and 2,6-di-t-butyl-4-piperidinomethyl phenol.
- Kline discloses that the level of AO is 0.1-10 parts by weight, and preferably 0.5-1.5 parts by weight per 100 parts by weight of polymer.
- Kline also teaches that the amount AO also depends on the amount of catalyst used to prepare polymer. This amount is 1-5 mole of AO per mole of transition metal in the catalyst.

For instance, it would be obvious to one of ordinary skill in the art to follow Luo and use 2 mmole (metal) / 100g butadiene. The skilled artisan would also find it obvious to use the maximum amount of AO prescribed by Kline, which equates to (5)(2 mmole) = 10 mmole of AO / 100 g butadiene. The routineer also would find it obvious to use 2,6-di-t-butyl-4-dimethylaminomethyl phenol (FW = 263). It follows that the one of ordinary skill in the art would find it obvious to use (10)(263) = 2630 mg of this particular compound / 100 g butadiene, which would represent 2.6 wt % (phr) of AO.

It may be argued that the amount of AO is governed by the amount of transition metal, where present in the polymer, but note also that Kline generically discloses use of up to 10 pw of AO. Thus, while one skilled in the art could use a the maximum amount of AO based on the amount of transition metal present (2.6 wt %), he would have found it just as obvious to use 10 pw (10 wt %), as generically prescribed, and achieve the same net result.

Applicants may rebut a prima facie case of obviousness by a showing of unexpected results over the closest prior art by comparison of data of appropriate, consecutive back to back tests. Objective evidence of nonobviousness must also be commensurate in scope with the claims.

In a previous declaration, Applicants showed that 2,6-di-t-butylaminomethyl phenol is effective in preventing crosslinking compared with 2,4,6-tris(dimethylaminomethyl)phenol. This result is not unexpected because Kline already states that not all metal deactivators of the invention are effective AO's, and that well known AO's possess a bulky substituent in the ortho-position relative to the hydroxyl group. One would have expected 2,6-di-t-butylaminomethyl phenol to be a better AO than 2,4,6-tris(dimethylaminomethyl)phenol based on structural considerations alone. Applicants have not explained fully or quantified the extent of metal deactivation observed in their experiments. There is no indication that one exhibits an unexpectedly pronounced effect over the other. This feature is significant, because one of ordinary skill in the art would use compounds disclosed in Kline for metal deactivation and concomitant prevention of oxidative degradation and discoloration. It remains to be seen whether use of one compound over another imparts some unexpected property or effect on the resulting composition.

There are two factors to consider. The first concerns the compounds themselves. Kline makes it obvious to one having ordinary skill in the art to use compounds 2,6-di-t-butyl-4-dimethylaminomethyl phenol, and possibly homologous structure 2,6-di-t-butyl-4-dimethylaminoethyl phenol. However, it is the examiner's position that compounds 2,6-diethyl-4-dimethylaminomethyl phenol and 2,6-methyl-4-dimethylaminomethyl phenol are not obvious from the teachings of Kline.

The second concerns the amount of AO, specifically, 2,6-di-t-butyl-4-dimethylaminomethyl phenol, that one would be find obvious to use based on Kline and Luo. It is not clear whether an unexpected result arises from use of a particular amount or range of amounts of 2,6-di-t-butyl-4-dimethylaminomethyl phenol, alone, or relative to a certain amount of transition metal component.

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